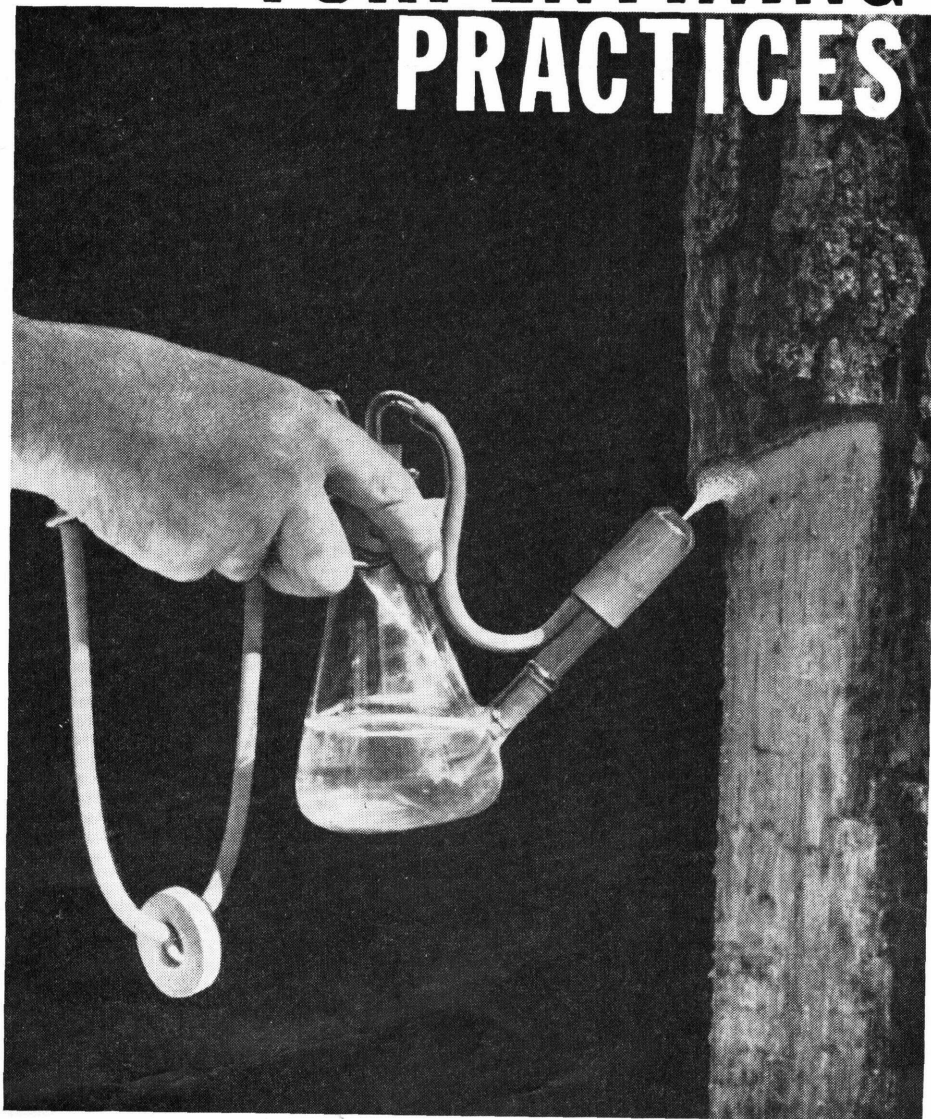


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Modern TURPENTINING PRACTICES



FARMERS' BULLETIN NO. 1984



U. S. DEPARTMENT OF AGRICULTURE

THIS BULLETIN outlines tested methods that will increase the efficiency of turpentine operations and yield a higher total return from the management of naval stores timber.

In these pages the gum producer will find out how to cup selectively in order to earn the most money from gum and wood products combined. He will also find here the new methods of chemical stimulation and bark chipping, and the ways in which they can be put to work to increase the efficiency of labor.

Many progressive producers have already become interested in the new methods, which can increase profits and help to insure the future of the gum naval stores industry.

Use these new methods in your own turpentine woods.

MODERN TURPENTINING PRACTICES

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INTRODUCTION

You can make your gum business yield a better income. Many others have already done it. How?

It is necessary only to apply better planning to your operations and to adopt new methods of turpentine. These methods, which include bark chipping, acid treatment, and conservative installation of tins, give more gum at less cost in money, labor, and trees than older methods. They were developed and tested largely by the Lake City (Fla.) Branch of the Southeastern Forest Experiment Station.

A well-known producer in the Lake City area tried bark chipping and acid application. He employed a man who had never chipped before. The chipper worked with a special bark-chipping hack and a simple lung-power spray gun for the acid. His chipping produced nearly twice as much gum that season as came from the same number of nearby trees chipped by the regular methods.

What is likely to happen to your business if you do not use improved methods? Producers of other types of naval stores will get a larger share of your market, because they can produce at a lower price. Your opportunity lies in getting more gum at the same cost or in getting the same amount of gum at a lower cost.

Let's take a look at your woods and see what you can do. It is good business to cut selectively in your denser stands, and to cut your worked-out trees promptly. That really makes turpentine a part of good forest management. The first step in improved management is to tie your gum production directly to the growing of other forest products in order to earn the greatest income from your woods.

The second thing you can do is cut the cost of producing each unit of gum. You can do this by stimulating the flow of gum with acid applied to the streaks, by bark chipping, and by putting tins in shallow cuts. Treating the streaks with acid increases the rate of flow of gum and also keeps the gum flowing longer. So, using the acid treatment,

¹ Acknowledgement is due the Naval Stores Research Division of the Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture, for tests of methods of distilling gum from acid-treated trees and of the characteristics of the gum products, and the Engineering and Industrial Experiment Station of the University of Florida, for developing the lung-power spray gun.

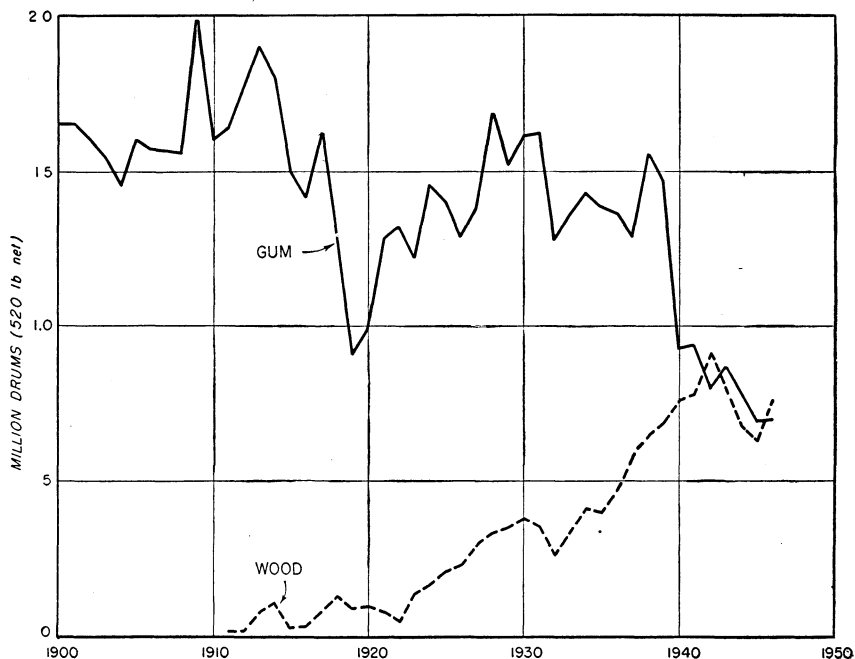


FIGURE 1.—Rosin production from gum and wood naval stores, showing the downward trend for gum naval stores. The data are from the Naval Stores Research Division, Bureau of Agricultural and Industrial Chemistry.

a chipper needs to chip only once in 3 weeks to get almost as much gum from a face as he can by chipping every week without the treatment. That means a great saving in labor.

Bark chipping, which should be used only with chemical treatment, is easier work than the present standard chipping; and it leaves the butts of the trees in better condition for other use.

Putting tins into shallow broadax incisions or tacking them in the streaks is a highly important part of virgin cupping. This is called conservative installation. Careful cupping practice alone can give as much as one-third more gum the first season. Shallow incisions do not cut off the flow of gum-producing materials as much as the usual deep broadax cut does.

If you and your neighbors can furnish a continuous supply of gum at a reasonable cost, the modern stills can and will continue to operate in a competitive market (fig. 1). If, as is generally expected, the stump-wood supply declines, the gum naval stores industry will be called on to fill the gap. Meantime, you can be drawing a steady income from your turpentine woods. Better practices mean more money, a regular income, and better living.

TURPENTINING—A PART OF FOREST MANAGEMENT

The turpentine tree is part of your forest as a whole. Trees can give gum, but they can also yield poles, sawlogs, ties, and pulpwood.

You will want to get the highest total income per acre that the best combination of their products will provide.

Does the 9-inch diameter-limit system of turpentine really give you the most profitable combination of products from your woodlands? It does not.

By the diameter-limit system you put a cup on every tree more than 9 inches through. During the turpentine period of about 10 years the growth of the whole stand is held back. At the end of this period all you have are small worked-out trees. They do not pay their way in terms of timber growth per acre. Practically the whole stand needs to be cut when turpentine is finished. This cutting is actually a salvage of what little timber value there is in small worked-out trees. After the useless part of the turpentine butt is discarded, you have only small upper logs. At best these small logs are expensive to handle and produce small, rough grades of lumber or other products. It is not good business to lose the timber values of your trees, especially when good-quality lumber, poles, and piling bring premium prices.

What should be done to get the highest income from your gum and timber products? Of course that depends on the size of your trees and the number you have to the acre. In open stands you may have to chip most of the trees to get enough cups per acre. Hold off turpentine in such stands until the trees are a foot or more in diameter. The larger trees give a much higher yield of gum at little or no extra



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FIGURE 2.—Selective cupping, which leads to selective cutting, will give you the greatest income from your forest land through a variety of products: gum naval stores, poles, saw timber, ties, pulpwood, fence posts and fuel wood.

cost. After they are worked out, they are large enough to make high-grade timber that is much more profitable to handle.

While you are waiting for your open timber to grow to good size, look to your denser timber that should be thinned out. Select the excess trees and the crooked and injured trees that should be removed to make growing space for the others, and cup these trees first. This is selective cupping (fig. 2). Selecting the trees for naval stores is really the first step in selective cutting.

The rest of the selective-cupping story concerns the trees you leave for timber growth. These are the straightest and best timber trees.



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FIGURE 3.—Your woods will look like this when cupped selectively. This form of turpentineing and handling of your woodlands will bring you the greatest return per acre, because you can harvest a larger quantity of saw timber, poles, ties, pulpwood, and other forest products to supplement your income from naval stores.

Their growth will increase as the trees around them are worked out and removed. You may have two, three, or even four such selective turpentineing cycles before you are ready to take out the final crop of high-value trees. In each succeeding cupping the trees are larger, gum yields are higher, and turpentineing is more profitable. When these trees are cut, they are also more valuable for timber. You get more and more instead of less and less.

Selective cupping will improve your forest (fig. 3). It is the only way turpentineing can be made a part of good forest management in young stands having a sufficient number of trees per acre. And it will pay in more and higher-valued products.

NEW METHODS OF TURPENTINING

To make each tree pay as much as you can through turpentine, you will have to operate as efficiently as possible. That is, your costs for producing say 200 barrels of gum must be as low as you can make them. The lower the cost of production, the better the chance of making a good profit. New turpentine practices that offer great possibilities for cutting this cost are: Regular chipping with acid treatment, bark chipping with acid treatment, and careful setting of tins in virgin cupping.

ACID TREATMENT²

Acid treatment, or chemical stimulation, as it is frequently called, means spraying sulfuric acid on the streaks immediately after chipping. The acid does two things. It makes more gum flow. It makes the gum flow for as long as 3 weeks. Let's see how treated streaks compare with untreated streaks. With regular chipping and no treatment, the flow of gum is good the first 2 or 3 days. Then it dwindles to a very low rate by the end of a week after chipping. A treated streak, however, has a fairly steady flow of gum right on through the week and by the end of 7 days has yielded more than half again as much as the untreated streak. The flow of gum from a treated streak gradually gets less and less until it practically stops by the end of 3 or 4 weeks. Yet one treated streak will yield in 3 weeks' time nearly as much gum as three of the untreated streaks.

A crop of 10,000 faces usually yields about 200 barrels of gum in a season if chipped once a week without acid treatment. If the trees are chipped once every 2 weeks and sprayed with acid, they still yield about the same amount of gum in a season. The same number of faces chipped once every 3 weeks and treated with acid yield about 175 barrels in a season. That means each untreated streak of the 32 chipped during the season for a crop of 10,000 faces gives 6.3 barrels. Each streak of the 16 made at 2-week intervals and sprayed with acid gives 12.5 barrels, or nearly twice as much. Each streak of the 11 made at 3-week intervals and treated yields 16 barrels—that is, over two and one-half times as much gum per streak as the weekly chipping without acid treatment can give.

Chipping only and applying no acid, a man can handle about 5,000 faces each week. Chipping and spraying, he can tend about 4,000 faces in a week. That means he can take care of 8,000 faces by using 2-week intervals and 12,000 faces by using 3-week intervals. By chipping and treating at 2- or 3-week intervals, a man can obtain from $1\frac{1}{2}$ to 2 times the amount of gum per season normally produced by weekly chipping without acid treatment (fig. 4).

In addition to getting much more gum per man per season with a longer chipping interval and chemical stimulation, you can make the working life of the trees longer. Or you can get the same amount of

² A reprint giving complete instructions for the use of chemical stimulants to increase gum yields may be obtained from the Southeastern Forest Experiment Station, Lake City Branch, Box 92, Lake City, Fla.

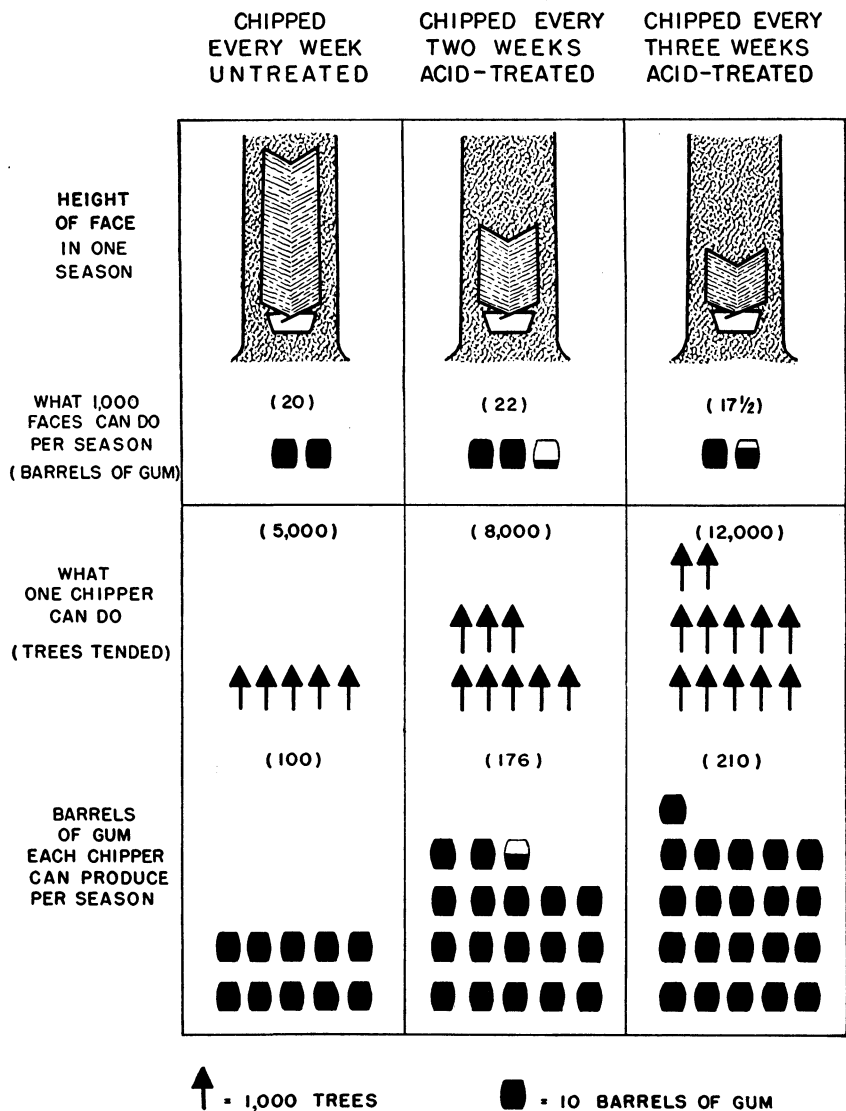
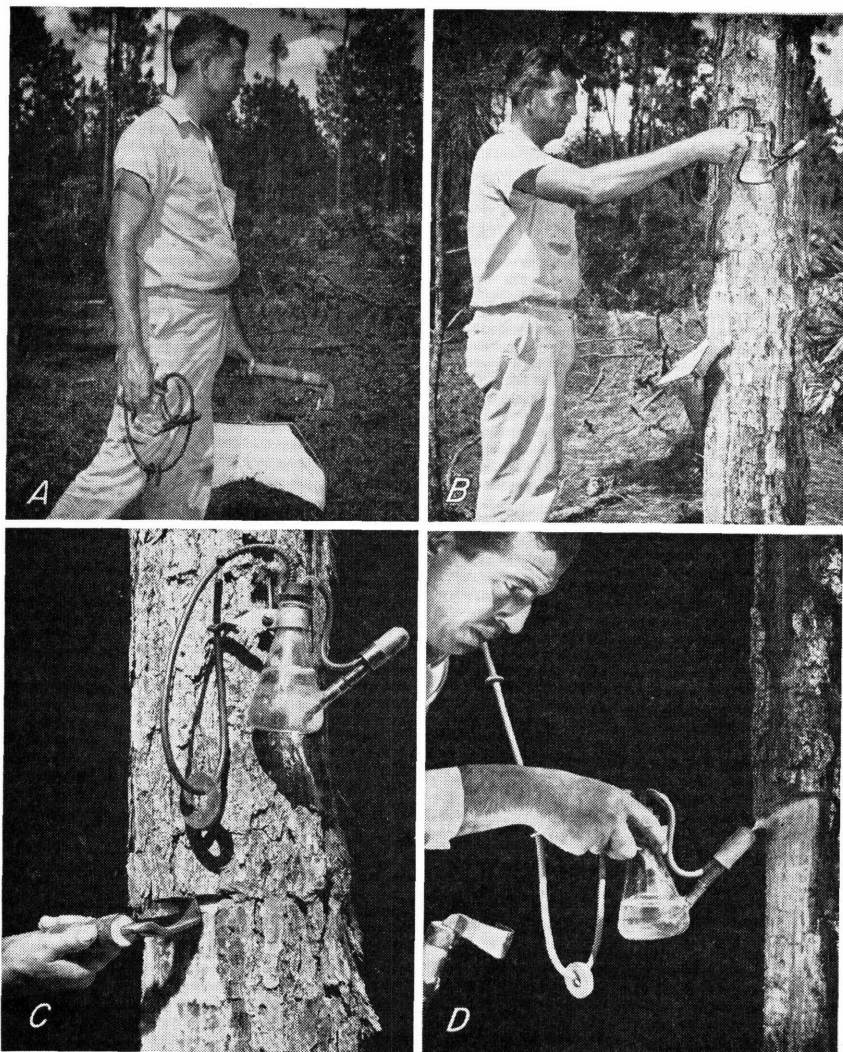


FIGURE 4.—Production by wood chipping at different intervals, with and without acid treatment.

gum per tree with a much shorter face and save some of the best part of the tree for lumber production.

Can anyone apply acid treatment to his turpentine trees? Yes. No special skill or ability is required. The average turpentine laborer can be taught to operate a spray gun properly with 15 to 20 minutes of careful instruction. The chipper should apply the acid. He spends most of his time walking from tree to tree, and operating the spray gun does not slow him up enough to justify the expense of hiring an extra man to treat the streak (fig. 5).



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FIGURE 5.—If the chipping procedures shown here are closely followed, the returns will be greater. This is the most efficient way of doing the job. A, Approach the tree with spray gun in one hand and back and cup cover in other; B, prepare for chipping by placing cover over cup and hanging up spray gun; C, chip; D, spray acid on freshly cut streak.

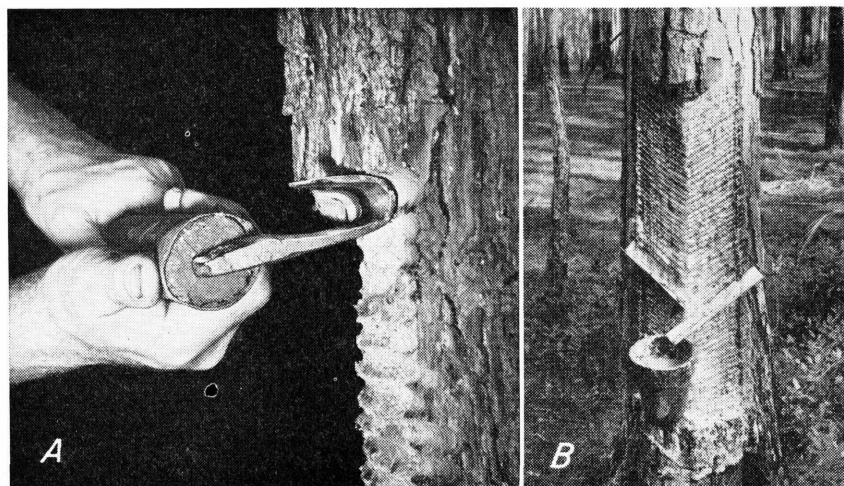
You can get the acid solution in a ready-mixed form, 40-percent solution as recommended for slash pine, and 60-percent solution for long-leaf pine. With a special spray gun for acid application, from 1 to 1½ quarts of acid will treat 1 streak on 1,000 faces.

Acid treatment is most effective in the spring and summer months, when gum flow is normally active. In the early fall, the benefits of weekly acid treatment drop off fast. Therefore, if you are using

weekly acid treatment, it is good business to stop it at that time. However, you can continue biweekly and triweekly treatment practically to the end of the naval stores season.

If you are using wood chipping each week, you can continue chipping from the time you stop the acid treatment to the end of the season. If you are using bark chipping, it does not pay to continue chipping without treatment. It is a good plan, though, to go back and chip out the inch or so of the acid-treated bark after the last treated streak stops running. That leaves your tree ready for a fresh start the next season.

Trees treated every week during an entire season do not have as high a gum flow during later years of acid treatment as in the first



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FIGURE 6.—Conventional wood chipping is harder for your chipper to learn, takes more effort, and leaves more scar than bark chipping. A, close-up of conventional wood chipping; B, appearance of chipped face.

season. Trees chipped and treated once every 2 or 3 weeks yield equal quantities of extra gum year after year.

Careful studies over a period of several years have revealed no effects of sulfuric acid on the health of the trees or on the occurrence of dry face.

BARK CHIPPING

Along with acid treatment you can use the new method of chipping in which only the bark is removed. When no acid is applied, one must chip into the wood and open the up-and-down resin ducts in order to get a normal gum yield. The smaller crosswise resin ducts exposed by peeling or chipping off the bark ordinarily do not put forth much gum. But when you chip off the bark and apply acid, these smaller ducts are opened up and the gum flows freely. Because the up-and-down and crosswise ducts are joined together, the whole duct system of the tree is tapped.

Bark chipping plus chemical stimulation gives yields at least as high as regular chipping plus chemical stimulation. Furthermore, bark chipping is lighter work than wood chipping (fig. 6) and is easier to teach to new men (fig. 7). Because only one flat surface is exposed in bark chipping, good application of acid is much easier to accomplish than in the case of wood chipping. Bark chipping also causes less weakening of the tree and less degrade of the trunk for wood products.

In using the bark hack, it is easiest to slant the $\frac{1}{2}$ -inch-high streak in only one direction from shoulder to shoulder. This "slant streak" makes it unnecessary for the chipper to change hands, as he must do with the customary V-shaped streak in wood chipping. Gum yields from the slant streak equal or exceed those from the V-shaped streak.

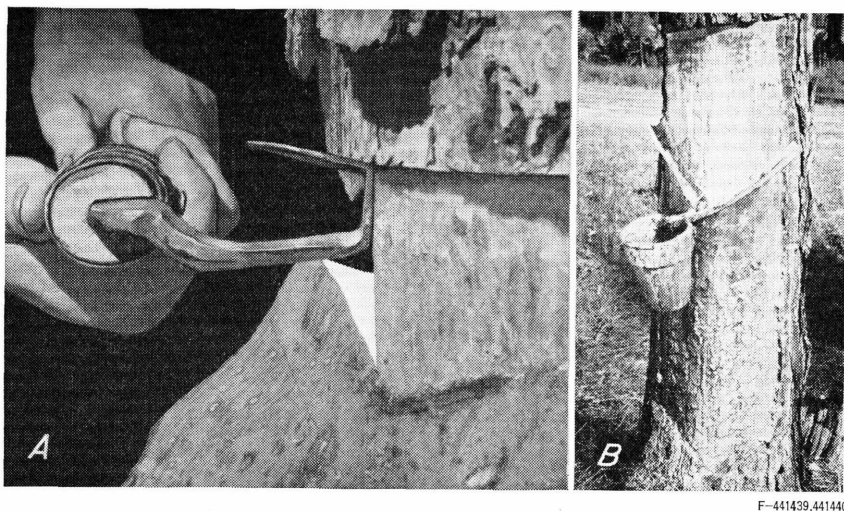


FIGURE 7.—Bark chipping can easily be learned by a new chipper, requires much less effort, and leaves the butt of the tree in a more usable condition than does wood chipping. A, Close-up of bark-chipping operation; B, appearance of bark-chipped face.

CONSERVATIVE INSTALLATION

If an operator uses bark chipping to interfere as little as possible with the passage of sap and gum, then conservative installation of tins is the next sensible move. "Conservative installation" is a term that means putting the tins into *shallow* broadax cuts or tacking the tins in streaks. All too often the practice is to hit the broadax hard. The result is a deep cut, especially in the center between the shoulder and peak of a face. The broadax cuts the flow of both resin and sap (fig. 8), and it takes the tree about 2 years to recover and reach its maximum rate of gum flow. As shown in figure 8, a deep incision cuts the gum yield about one-fourth (27 percent) the first season and over one-fifth (22 percent) the second season. By the third year the tree has completely overcome the handicap put on it by the deep cut. If you want to keep your gum flow high, put the tins in shallow cuts or tack them in streaks. The same principle applies to methods of raising tins.

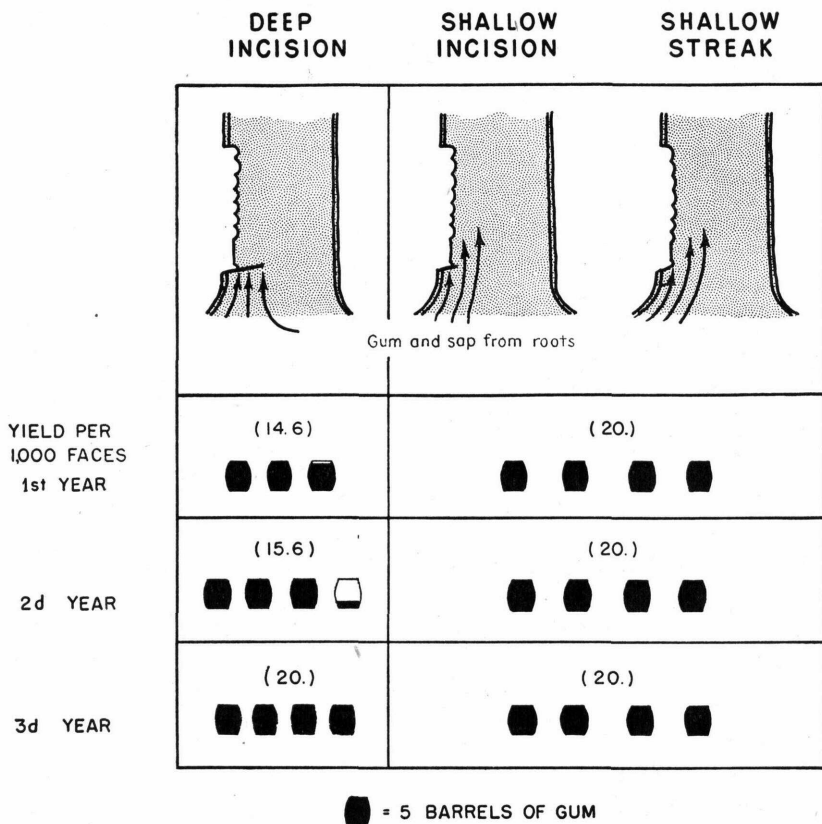
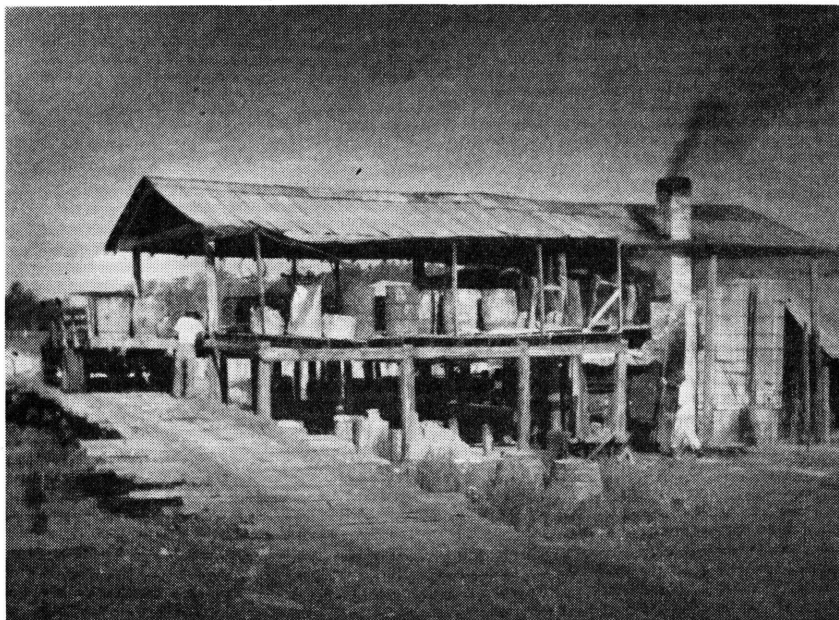


FIGURE 8.—Comparison of effect on yield of deep incision and shallow incision or streak.

DISTILLING METHODS HAVE IMPROVED TOO

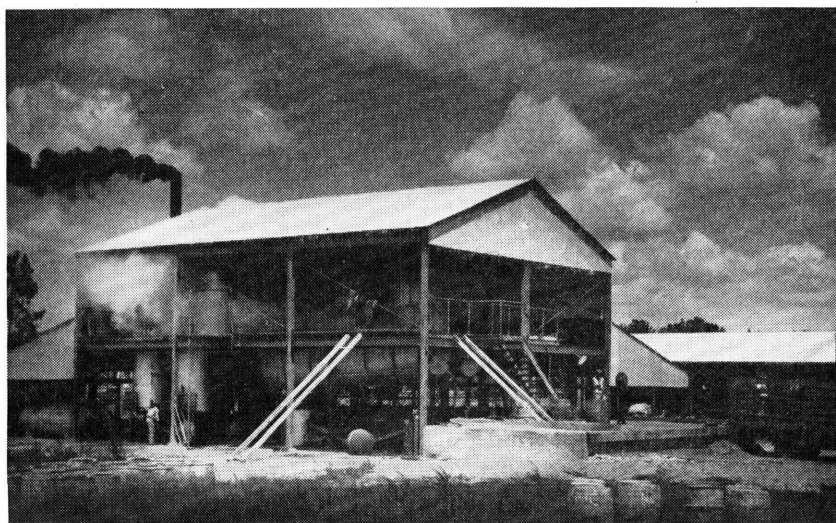
The old-time still, with a fire directly under it, served its purpose well. It was a very simple plant, easy to operate, and easy to move to a new location in the days when it was customary to move on to other virgin timber. Gum fresh from the woods, plus varying amounts of chips, bark, and pine straw, was dumped into the kettle of the old fire still. Distillation itself was controlled partly by guess. Contamination and scorching lowered rosin grades. Today, gum from acid-treated trees frequently gives a cloudy looking rosin when processed in a fire still (fig. 9) unless blended with gum from untreated trees.

Settling down of the gum naval stores industry to permanent cropping and the improvement in transportation brought in larger central stills which steam-distill the gum. These steam-distillation plants dilute and filter the raw gum. They treat the gum chemically (usually with acid) to produce the paler, more valuable grades of rosin (fig. 10). Just before distillation, the gum is jetted into water, and any mineral acid sprayed on the face of the tree or added in the plant is completely washed out.



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FIGURE 9.—The old direct-fire still, once standard for processing gum, is now on the way out. This type of still frequently gives a cloudy rosin with gum from acid-treated trees if the gum is not blended with that from untreated trees.



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FIGURE 10.—Clear, unclouded rosin is obtained when gum from acid-treated trees is processed in a modern steam-distillation plant.

The establishment of permanent steam-distillation plants to handle gum has encouraged small resident producers and gum farmers. These modern central stills need a good supply of gum each year from territory close by. Farmers interested in continuous yields from their woodlands thus have a dependable market for their gum in large or small quantities. Well-managed woodlands and permanent modern stills will lead to a more stable industry.



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FIGURE 11.—A modern turpentine community helps to reduce labor difficulties.

Gum production in the woods, however, depends on turpentine workers. The housing and community living that is offered these workers will have to compare with the urban living that accompanied many wartime jobs (fig. 11).

All in all, improved woods methods can make turpentine more attractive to you financially. And more efficient turpentine operations can be made a part of the good forest management of your woodlands—good management that will give you the highest possible returns per acre each year, a stable industry, and a good living.